HGG001-01   Room:201A   Time:May 26 08:30-08:55

The Grand Challenges of ICSU and GLP - A Japan View

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Land is one of the vital resources for human being, but it is under a mounting pressure from competing land uses, land degradation, reckless land transformation, ecosystem disturbances, land-related hazards, water shortages, nutrient depletion, massive mineral extraction, etc. Global Land Project (GLP) has been involved in such hot environmental issues for years, but its research efforts have been relatively modest in the light of the rapidly worsening situation. The Grand Challenges, an international decadal research guideline for global sustainability announced by ICSU (International Council for Science) in October 2010, offers a great opportunity of activating research related with GLP under a joint partnership of natural and social scientists. The present paper discusses what GLP-Japan should do in cooperation with the geosciences community in Japan under the framework of the Grand Challenges.

Keywords: GLP, ICSU, Grand Challenges, sustainability, land use, human geosciences

HGG001-02   Room:201A   Time:May 26 08:55-09:10

Current activities of Global Land Project

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Global Land Project (GLP) is research program for land system to measure, model and understand the coupled human-environment system as a core-project of International Geosphere-Biosphere Program (IGBP) and International Human Dimensions Program on Global Change (IHDP). GLP is operated by Scientific Steering Committee (SSC) consists of relevant scientists and International Project Office (IPO) currently based at University of Copenhagen, Denmark. GLP has three thematic nodal offices in Aberdeen (UK), Beijing (China) and Sapporo (Japan). Here, I report the previous outcomes, current status, on-going activities and future direction of the GLP as a member of SSC.

Keywords: Land system, Coupled human-environment systems, Land use changes, Global environment changes

HGG001-03 Room:201A Time:May 26 09:10-09:25

Comparison of ecosystem networks in Mongolia grassland and Malaysia forests

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Remarking specially the network structure of social-ecological systems, we are executing a project titled 'Collapse and Restoration of Ecosystem Networks with Human Activity' (http://www.chikyu.ac.jp/rihn e/project/D-04.html) in Research Institute for Humanity and Nature (http://www.chikyu.ac.jp/index e.html). 'Ecosystem Network' is the key concept that we propose newly in this project. It is the social-ecological system where network of ecological subsystems characterized by land-cover or land-use, such as grassland, forests, rivers, agricultural fields and mine areas, with human network affecting quality of and transition among the subsystems. The usefulness of this concept is to see the human impacts through changes in land-cover, of which data are available from statistics, field survey and satellite information.

Field research takes place in tropical rainforests in Sarawak, Malaysia, and grasslands of Mongolia. In the last few decades, social and environmental conditions in both places were profoundly affected by resource extraction, which has recently intensified in relation to demand from global economy. Though their ecological characteristics, such as the regeneration time of vegetation and position of humans in the food web, are quite different, the livelihoods of many inhabitants of these regions are dependent on natural ecosystems.

In Mongolia, we: (1) found the most serious environmental problem to be increased degradation of pastures, especially near Ulan Bator, caused by overgrazing by an increasing number of livestock, especially goats; (2) studied the social patterns leading to concentrations of livestock to urban areas; (3) analyzed climate data in order to clarify the roles of forests and shrubs in maintaining sustainable pastures; and (4) conducted scenario analysis of the effects of several options, such as restriction of the number of livestock and restriction of the movement of livestock through privatization of land, on pasture degradation.

In Sarawak, we: (1) found the most serious environmental issues to be the mass logging of forests and expansion of palm plantations, and their negative effect on biodiversity and forest resources available to inhabitants; (2) conducted questionnaire surveys along the Rajang and Baram rivers, two main rivers in Sarawak, in order to identify the reasons; (3) examined biodiversity patterns of several plants and animals depending on human activities; (4) analyzed the effectiveness of, and problems with, institutions and systems such as forest certification and bio-prospecting in regulating rapid plantation developments.

Finally, we have begun to develop a general theory of conservation of ecosystem networks. In this process, we found that the networks have remarkable difference between grassland and forest systems. This is based on differences in economic properties for humans in the two ecosystems. In Mongolia, the vegetation itself (grasses) has no direct value for humans; the value is stored in livestock that feeds on the grasses. Therefore, global economy affects the behavior of inhabitants, leading to overuse of the vegetation and degradation of the grassland. In this case, the effective solution to the problem should involve changing the behavior of inhabitants. On the other hand, in Sarawak, the economic value is stored in the vegetation (trees). Therefore, enterprises and governments tend to severely develop the forests, causing both reductions in the amount of forest available to inhabitants and biodiversity loss. The effective solution here should involve regulation of enterprises and governments. We are exploring a mathematical model representing the difference of networks, and examining effective strategies for sustainable management of the systems.

Keywords: Ecosystem network, Mongolia grassland, Malaysia rain forests, Scenario approach, Network conservation theory

HGG001-04　　　　　　　　　　Room:201A　　　　　　　　　　Time:May 26 09:25-09:40

Application of a terrestrial ecosystem model to assess human appropriation of net primary production in Asia

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Human appropriation of net primary production (HANPP) is a major indicator of human pressures on ecosystems. Land use induced changes in the productivity affect the processes and functions of ecosystems and they are associated with the provision of ecosystem services, such as the provision of biomass through agriculture and forestry, and the regulation services such as the absorption capacity for GHG emissions. A number of studies have been assessed the amount of human induced changes of NPP in the global level and calculated in spatially explicit way. However, the analysis of socio-economic drivers of the changes is still remaining as the main topic in the field. The interrelations between HANPP and social structures and processes are priority of global change research (Haberl et al. 2008).

The methodologies for credible HANPP assessment have been established in the previous studies. The proposed three parameters are (1)NPP0: NPP of the vegetation that would be assumed to prevail in the absence of human use (potential vegetation), (2)NPPact: NPP of the currently prevailing vegetation (actual vegetation), (3)NPPh: human harvest of NPP (e.g., through agriculture and forestry). We estimated these parameters in Asia using a process-based ecosystem model that describes carbon and nitrogen dynamics of plants and soils for terrestrial ecosystems of the globe. The socio-economic data on crop and timber harvest was applied to estimate the amount of human harvest of NPP. The parameters were calculated for each political unit to discuss social structures responding to various ecosystems. Based on the estimated parameters, we suggest the effective methodology combining spatially explicit gridded data and socio-economic statistical data.

Keywords: human appropriation of NPP, process-based ecosystem model, land use change, social adaptation

Recent changes in land use and natural resources use in the Kyrgyz Pamir

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The Kyrgyz Republic became independent from the former Soviet Union in 1991. The country has become suffered from severe poverty since the independence. The southernmost area of the Kyrgyz Republic is one of the least developed areas in the country. The largest issue in the area, therefore, is to bring economic development to mitigate poverty. The area consists of the Alai valley and two mountain ranges, i.e., the Alai Range to the north and the Za-Alai Range to the south. The valley floor starts at the altitude of 2,240 m in the western Alai area (Karamyk), and goes up the altitude of 3,160 m in the eastern Alai area (Sary Tash), which exceeds the cultivation limit. Transhumance is the primary industry of the entire Alai area. Sustainable use of land and natural resources is a key to mitigate poverty. This study first examined the characteristics of the current land use, and identified changes of land use before and after the independence focusing on pastureland. Then, this study examined the status of nature resources consumption, and discussed sustainability in the area.

The current land use map was prepared by re-digitizing the land use/land cover map of Baird (2008) for the purpose of re-categorization: 15 categories were re-classified into 6 categories of agricultural land, high mountain pastures, mountain pastures, forest, bare ground, and nival zone (snow and ice). The re-classified map shows that high mountain pastures dominate the majority of the land cover in the entire Alai area (88.3% in the western Alai, 48.1% in the central Alai, and 52.2% in the eastern Alai). Agricultural land ranges from 0.3% (western Alai) to 3.3% (central Alai). Non-usable land (bare ground and nival zone) occupies more than 40% in the central and eastern Alai, but it can serve as a good ecotourism resource.

Agriculture production is observed mainly in western and central Alai, and none in the eastern Alai. Hence, the eastern Alai needs more dependence on livestock and alternative income generation. The area of pasturelands (high mountain pastures and mountain pastures) in the eastern Alai, however, was smaller than other areas, especially western Alai. The number of grazing animals is also small in the eastern Alai.

The valley is suitable for grazing of sheep, goats, cows, yaks, and horses, which has been the largest industry in the area. Spatial patterns of grazing have changed after the independence in 1991. Local residents witnessed that more grazing is presently practiced near the villages. This could be a major factor causing soil erosion on the slopes near villages and roads. However, the interview surveys suggested that such soil erosion had occurred before the independence. This contradicts the general view by international donor agencies, which promote land degradation mitigation projects.

The interview survey conducted in 2008 and 2009 suggests that several wildlife species inhabit the Alai valley area such as ibex, lynx, bear, marmot and fox, although argali (Marco Polo sheep) is threatened by extinction. Ibex and marmots have been consumed in the valley. Local residents should realize that such wildlife could be ecotourism resources: it is, therefore, suggested to conserve the wildlife. On the other hand, more wolves have become attacking domestic animals since the independence.

The questionnaire survey in 2008 suggests that many residents favor development of ecotourism because of the far behind economy. Ecotourism to be developed in this area should be connected to agriculture, grazing, and artifact. Not only establishing ecotourism in the eastern and central Alai areas but also developing markets of agricultural products within the valley (supplying agricultural products from the western Alai area to the eastern and central Alai areas) would help augment sustainability in the entire Alai area.

Keywords: The Pamir, land use, poverty, natural resources consumption, pastureland, sustainable development

HGG001-06   Room:201A   Time:May 26 09:55-10:10

Assessment of biodiversity and ecosystem services of Satoyama, traditional rural landscape of Japan

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Satoyama is a Japanese word used to refer to the mosaic of mixed coppice forests, rice paddy fields, upland fields, grasslands, streams, ponds, reservoirs for irrigation and settlements that make up the traditional rural landscape of Japan. Although social, political and economic changes since 1960s such as agricultural innovations and fuel revolution have caused declines in ecosystem services and biodiversity in Satoyama, recent socio-economic and environmental situations have raised the people's awareness of energy and food securities, and potential values of Satoyama. Millennium Ecosystem Assessment has also chosen Satoyama and Satoumi (local coastal waters) as a target for sub-global assessment. However, little is known about the changes of biodiversity and ecosystem services, and their relation in Satoyama at national scale. In this study we devised indicators to assess biodiversity of Satoyama and developed models to assess regulating services at national scale using common database such as "digital national land information". We assessed biodiversity at national scale by using JOIN values (e.g. paddy-forest, paddy-built-up area). We also developed assessment models of regulating services by modifying existing models and measured the values of several regulating services. Those values were compared among rural landscape types which were established by Rural Landscape Information System (RuLIS) of Japan. The results suggested that the spatial and temporal conditions and trends of biodiversity and regulating services could be evaluated effectively by using RuLIS landscape types.

Keywords: satoyama, biodiversity, ecosystem service

HGG001-07   Room:201A   Time:May 26 10:10-10:30

ENVIRONMENTAL IMPLICATIONS OF AGRICULTURAL DEVELOPMENT IN PATIALA DISTRICT, PUNJAB, INDIA

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The green revolution in India, one of the most remarkable achievements in the field of agriculture has led to self sufficiency in food production which increased from mere 51 million tonnes in 1950-51 to 210 million tonnes in 2006-07. The new technology has not only increased agricultural production, but also created a wide range of environmental problems viz., deforestation, water logging, salinity, alkalinity and ground water pollution in the fertile tract of Punjab. Intensification of land development over the years has led to degradation of the fragile agro-ecosystem of the state. The present study of Patiala district is mainly an agricultural district as 82.61 per cent land area is under cultivation. The blockwise consumption of ground water shows that out of nine blocks, eight blocks were categorized as overexploited blocks where the ground water development is above 100 per cent, whereas only one block was under white category. High yielding varieties of water intensive crops like rice and wheat require larger amounts of ground water that has resulted in ground water depletion. It was analyzed that certain blocks like Derabassi and Ghanaur obtained a very high growth rate (1994-95 to 2006-07) of 35 per cent in terms of areal extent of cultivation of rice. Similarly, blocks like Rajpura has a high growth rate of 18 per cent in wheat cultivation during the same time period. The two hypotheses postulated were tested with the help of correlation technique. One of the hypotheses regarding the relationship between agricultural development and ground water depletion was found to be positive relationship as the calculated r value was 0.06. This suggests that there is a positive or direct relationship between the level of agricultural development and ground water depletion. The other hypothesis regarding the relationship between environmental degradation and level of agricultural development proves to be negative (r = -0.05) which means that there is an indirect relationship between the two. In other words higher is the level of environmental degradation lesser will be the level of agricultural development. The problem related to burning of crop residue especially rice straw which is adding poisonous gases into the atmosphere but is also responsible for depleting soil nutrients from the soil. This local issue has large global implications. It can be dealt through the alternative use of straw as a fuel in factories or consumed by animals as fodder after refinement.

Keywords: Green revolution, Land intensification, Environmental degradation, Crop residue burning, Punjab, India

HGG001-08   Room:201A   Time:May 26 10:45-11:00

The present situation and issues of Joint Forest Management (JFM) in India

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In India, after the continuing forest loss, the Joint Forest Management (JFM) began in the 1990s. In the early 1980s the rate of forest cover fell to 10%, and it has recovered to over 20% in the 20 years. JFM is one type of Participatory Forestry spread all over the world, which has been praised these achievements. But, looking at the quality of the forest, we can see the fact that the dense forest has continuously changed to the scrub. And we cannot altogether regard them as a good thing.

In this study, we would like to discuss about the current situation and issues, by comparison of the JFM between the northern India (Rajasthan, Haryana) and the southern India (Karnataka, Tamil Nadu). In the south, we will discuss the relationship between the conservation of the dense forest and JFM at the southern part of the Western Ghats on the border region between Karnataka and Tamil Nadu. Karnataka state is the most advanced state of the deforestation. In the north, we will focus to the so-called the evaluation of the afforestation project. For more, we will pay attention to the features of the broader land use by dealing with not only forests but the *region* of including forests.

Keywords: Joint Forest Management, Deforestation, Rajasthan, Karnataka

HGG001-09 Room:201A Time:May 26 11:00-11:20

Trend on Jabodetabek Region LUCC_Urban expansion and sustainable issues in regional and national context

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The study focuses to describe spatial development characteristics of so call Jabodetabek Region. For that purpose, the study examines the spatial dynamics of urban development of Jabodetabek Region as the Greater Jakarta expansion. Being significantly different from the urbanization and suburbanization in USA and Europe and other countries, the continuing outward expansion of Jabodetabek Region have not only some similarity in many aspects of urban development spatial pattern, but also showed some significant differences. The development of Jabodetabek Region have similar in their trend to be the primate city of its country whereas the urban systems arising with densely population, mixed land uses and mixed economic activities of the inhabitants in their suburb. On the other hand, agriculture land uses, especially rice fields areas and the spread of farming households in the suburbs are still significant but spatially distributed in a different pattern.

This study aims to: (1) describe spatial pattern and dynamics of land use cover changes (LUCC) of Jabodetabek Megapolitan during the period of 1972-2010 due to its dynamics of population and socioeconomic; and (2) develop some urban expansion models to forecast environmental impacts. Satellite images and GIS analysis were employed for LUCC analysis. Statistics analysis of spatial decay function models were employed to analyze spatial pattern of LUCC and demographic patterns. Suburbanization and a weak system of integrated planning imply to many environmental problems such flood, drought, sea-water intrusion, etc. It's also impact on economic inefficiency on natural resources use. The hegemony of economy in Jabodetabek is not balanced by sufficient multiplier effects on the national economy. Further, it has brought about a social fragmentation that is likely to sharpen potential social conflicts among the communities in the suburban areas.

Spatial polarization of economic activities of Jabotabek region makes contrast the city's core with its surrounding areas in Jabotabek Region. Urban development of Jabotabek Region tends to form a concentric spatial distribution of land use and socioeconomic aspects. The core of Jabotabek Region is highly predominated by manufacture and services activities and it has been surrounded by highly mixed land use urban fringe and the most remote areas predominated by agricultural land uses and farmers settlement areas.

The hegemony of national economy in Jabodetabek, particularly as a result of the dominant contribution of tertiary and primary sectors in the region is in fact not accompanied by the presence of adequate multiplier effects on the national economy. Instead, what happens is the backwash phenomenon between DKI Jakarta and other regions in Indonesia outside the metropolitan. A synergic (generative) interrelationship between the development of this region and other Indonesian regions can be created by integrating the strategies of regional development.

Keywords: land use/cover change (LUCC),, Jabodetabek megapolitan, spatial distribution of land use, suburbanization,

Landform and Land Cover Changes by Human Activity on the Sanjiang Plain, China

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Objective

Sanjiang Plain is located in Heilongjiang Province in northwest China, surrounded with three rivers, Amur, Sung Hua and Ussuri. There were much wetland in this place, but the wetland had been reclaimed by the Chinese government from the 1980s. To grasp how wetlands were cultivated was important, but there were merely fragmentary statistic data.

In this study, the landform map was made in advance, agricultural increase was grasped the cross-sections of the wetlands made and how wetlands decreased were clarified by satellite data. The landforms on which wetlands were reclaimed were clarified conclusively.

Methods and Results

The authors used SRTM (Shuttle Radar Topography Mission) by NASA to make the elevation map and cross-section of the Sanjiang Plain. Sanjiang Plain was very low and flat in the middle and lower reaches of the Amur River. Landform is very flat except for some hills and mountains. The difference of the elevation is about 5 - 25m from the river.

JERS-1/SAR by JAXA data used L-band which was most suitable to observe soil water. Because the resolution of JERS-1/SAR is high (18m), the land form is classified by visual observation of texture on image.

The landform map was made by elevation map and JERS-1/SAR data. There were floodplains around rivers. The alluvial plain was surrounded with the rivers. There were three terraces on the alluvial plain. The lower and middle terraces were each separated into two terraces. The gentle slopes on the base of the mountains were around mountains. The dissected terrace valley and the swampy area on the lower and upper terraces were on the alluvial plain. Some old river course and old swampy areas were distributed near the Amur River and the Sung Hua River. Natural levees are well-developed along the Amur River. The wetlands were distributed mainly on the floodplains.

As for reclaimed land, false color of Landsat/TM was used because land cover could distinguish with a high degree of accuracy by visual observation of texture on image. The reclaimed land map of 1992, 1996 and 2006 was made. The reclaimed land had been increased from 1992 to 2006 except for Honghe national natural reservation area. The reclaimed lands were increased mainly in the alluvial plain and the floodplain from 1992 to 1996. The reclaimed lands were increased mainly in the dissected terrace valley and the swampy area on the terrace from 1996 to 2006.

In the wetlands in the field investigation, the vegetations on the wetlands were recorded and the heights of slightly elevated areas were measured with a hand level (Nobel K50-1560). The cross-sections of the wetlands on the selected landforms were made. The forms and vegetation of wetlands differs on different landforms. *Carex spp.* and *Gramineae gen. spp.* which were found typical in wetlands were the main vegetation in wetland on all landforms. In the wetlands on the lower floodplain and dissected terrace valley, there were some submerged areas. In the wetlands on the swampy area on the terrace, there were alternately dry area and wet area. In the wetlands on the alluvial plain, there were also alternately dry area and wet area but drier than the wetlands on the swampy area on the terrace. In the wetland on the mountains, there were relatively many kinds of plants.

The areas of wetlands and crop lands were calculated by JERS-1/SAR and LANDSAT/TM from 1992 to 1996. The crop lands had increased on all landforms. The wetlands on alluvial plain had been mainly cultivated.

Conclusion

The wetlands on the alluvial plain had been reclaimed mainly. [22:32:20] The alluvial plain wetlands were easy to reclaim because they were relatively flat and dry without trees. The wetlands on the swampy area on the terraces were wet and suitable for making rice paddy. The wetlands on the lower flood plains were not good for agricultural land because they were sometimes damaged by flood.
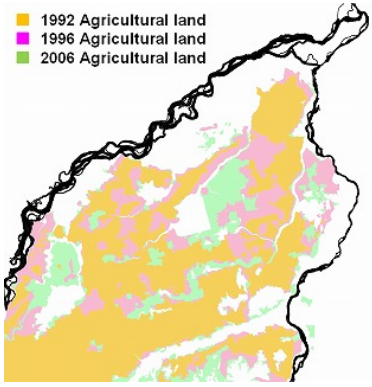
Keywords: geomorphological map, JERS-1/SAR, wetland

Recent Trends of Housing Development in Beijing Metropolitan Area

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In this research, the recent regional trends of the housing development in Beijing were considered. Beijing is the capital of China, and an economic city representing China as well as Shanghai. Therefore, it is important to consider the feature of the housing development of Beijing in order to understand the land use change affected by the economic growth, living condition of the citizens and political changes concerning urban area in China.

The results of the consideration are as follows. The housing development of Beijing developed rapidly after 2000. However, the population and the housing development of Beijing after 2005 are showing the tendency to stagnate though it has increased continuously after 2000. Because the decline is not seen in the increasing tendency as for the development of the luxury condominium and villa, the city government has not put out a new development permit at the luxury home. A large amount of luxury home including the detached house has already been developed in Beijing, and it has appeared in the market. Higher socioeconomic population who generally has a good private car is hoping to take better living environment even though in the area of far from the downtown of Beijing.

A large amount of residential house has been developed in the area within the range of 10 to 30 kilometers from the city center. The maintenance of road and subway system advances, and the access with the city center has improved to these suburban areas. On the other hand, the housing development area has drastically decreased in the city center and its surrounding area influenced by the surging land prices and the intensification of economic urban function in recent years.

The Beijing government is relatively advancing the supply of secured house of the lower price to the citizens who cannot correspond to the soaring house prices. A lot of houses of such a low price are not developed in the city center, and constructed in the suburban areas left from the urban area. The housing development of the suburban area progresses in Beijing in recent years, and the land use change from the farmland to the housing lot is dominating. The Beijing government is planning a multi-nuclear urban structure for the spatial expansion of the built-up area and restructuring of the economic structure by maintaining the new towns. The Economic-Technological Development Area of Beijing has been designated as one of the new towns, and the role as the residential area is expected in the area. It is necessary to pay attention to that the economic-technological development area developed as a means of industrialization and economic development before is changing to have its role in the urban structure from the city center to the suburban area.

Keywords: economic growth, residential house, suburban area, urban spatial structure

Land use change and natural disaster in Phuket Island

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The author analyzed the community-based activities and response for great 2004 Tsunami along the west coast in Phuket and described landform map of pocket beach and vulnerability map. The rapid land use change and development for resort such as building the hotels, shopping markets and parks was studied and compared with environment factor for evaluation. Immigration and land use change guided for difference prevention and mitigation activities. In two decade, the land use change in Phuket pushed hazard vulnerability and local community-based prevention activities. The Thai traditional society holding the community-based activities where did not affected by development for international resort area. Geographers should propose the appropriate land use planning and building community-based activities against mitigation.

Keywords: Tsunami, land use, landform, Phket, disaster prevention

Analysis of 5 years land cover transition for a study area in Central Kalimantan, Indonesia

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The purpose of this paper is to analyze land-cover maps from two points in time for a study area within Central Kalimantan, Indonesia, in order to characterize the systematic land-cover transitions. Through this study we analyze whether the observed transitions appear to have occurred under a systematic or a random process, according to the quantitative information in the transition matrix. We construct the transition matrix to show the magnitude of each transition and to analyze the amount of gain and loss of each land cover category between 2000 and 2004. The amount of gain of a category is assessed relative to the distribution of the other categories in 2000 to compute the magnitude of the transitions be expected if the process of gain were distributed randomly across the 2000 landscape. The expected gain under a random process is then compared to the observed gain to distinguish between random and systematic transitions. In a similar manner, the expected loss under a random process is also compared to the observed loss in order to distinguish between random and systematic transitions, in terms of the losses. This paper also analyzes the net change and swap change between land cover categories. For this analysis, the net quantity change is less than 10% of the study area, while the total change is close to 35%, the latter due to considerable swap changes, which is about 25%. We identified the systematic transition between grass/scrubland and bare land. Despite the big quantity change between forest and bare land, the change is not systematic, which means when the forest loses, it is not especially vulnerable to bare land and when the bare land gains, it does not target on forest. The big quantity change is simply due to the fact that these two classes are the two largest classes in the landscape. This in depth analysis has enabled the quantification and visualization of the major signals of transitions of land cover in the study area.

Keywords: Land cover transition, Change matrix, Central Kalimantan

HGG001-14 Room:201A Time:May 26 12:30-12:45

General Discussion on GLP Research Strategy

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A general discussion is held on GLP research strategy based on the presentations in the GLP International Session.

Keywords: GLP, ICSU, Grand Challenges, sustainability, land use, human geosciences

HGG001-P01   Room:Convention Hall   Time:May 26 14:00-16:30

Indigenous Ecological Knowledge and conservation in traditional agricultural landscape of Satoyama in Japan and Hani Ter

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Abstract: Indigenous ecological knowledge (IEK) can contribute to the management of local ecosystems and landscapes. Cultural landscapes are produced by, and reflected, the long-term interaction in indigenous societies of humans and nature. Taking the traditional agricultural landscape of Satoyama in Japan and Hani Terrace in Southwest China as case study, this paper summarize the IEK of the indigenous peoples in Japan and southwest China, including the management of water, forest, and soil resource, the vertical landscape pattern and resource-circulating system. The paper also stresses the challenges and threats facing the Hani IEK and cultural landscape of rice terraces, and discusses the potential integration of the IEK and cultural landscape conservation.

Keywords: Indigenous ecological knowledge, Conservation, Traditional agricultural landscapes, Rice Terraces

HGG001-P02   Room:Convention Hall   Time:May 26 14:00-16:30

Relationship between land surface condition and shallow groundwater in the Irrawaddy River delta, Myanmar

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Groundwater is widely used as a water resource in the Irrawaddy River delta. But, Groundwater has some chemical problem in part of the area. To use safety groundwater for health, it is important to make clear the actual conditions of physical and chemical characteristics of groundwater in this delta. Besides, Irrawaddy River delta is one of the most riskiest area by the flood and high waves through cyclone or monsoon. Especially, change of land surface condition by any disaster affect to the physical and chemical characteristics of shallow groundwater. So, it is necessary to make clear the actual condition of effect of land surface conditions to the shallow groundwater, to secure a good aquifer for sustainable shallow groundwater resource supply.

The purposes of this study are to analyze the physical and chemical characteristics of shallow groundwater quality related to geomorphology, geology and land use. Water samples are collected at 36 measurement points of river and groundwater in the dry season (January, 2010) and wet season (September, 2010), and analyzed dissolved major ions and oxygen and hydro-stable isotope compositions.

There are some groundwater flow systems and these water qualities are different in each area. Also, shallow groundwater quality composition showed Na-Cl-HCO^3 type at central delta. This type is not similar to Irrawaddy River water which showed Ca-HCO^3 type. According to the relation deuterium and d-excess, it is estimated that recharge area of shallow groundwater is Pegu and Alakan mountains or Irrawaddy River water. At the central delta, Shallow groundwater is mixed by both waters.These showed that Irrawaddy River water is recharge to the portion of sallow groundwater, but chemical characteristics is not affected to the shallow groundwater. So, chemical characteristics of shallow groundwater are closely related to geomorphogical, geological and land use conditions. Land use is crops, paddy field and residential area in the delta, so it is possible that this water quality type is effect by any human activities. At the shallow depth of western area and the 10 to 40 m depth of central area, groundwater quality composition is similar to Irrawaddy River water. Seasonal change of groundwater qualities is different in each area.

It was summarized that shallow groundwater quality is affected by land surface conditions which is different in each area.

Keywords: Irrawaddy River delta, shallow groundwater, land surface condition, human activity, water quality

HGG001-P03   Room:Convention Hall   Time:May 26 14:00-16:30

Environmental change of the middle and lower reaches of the Ayayawady river

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We forcus to study of river morphology and natural environmental change for the middle and lower reaches of the Ayayawadi river.Firstly, the meandering index was constructed refered with Szuki's methodology and reconstructed the meandering process on the Japan Army map published 1960's. After that the remote sensing data (ETM and TM images) producted by NASA in 2000 was analyzed meandering process and we comparedw with 60years river morphologic change of the Ayayawady river. Compaered with geomorphologic land classification map of the Ayayawady river basin, the meandering index was evaluated for 11 segments and the cahging ratio during resent 60years is clarified.

Keywords: Ayayawady riever, meandering, environmental change

Characterizing temporal vegetation dynamics of land use: Case of agricultural lands in Java Island, Indonesia

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Monitoring land surfaces continuously allows characterization of temporal vegetation dynamics. Considering seasonal vegetation dynamics in multi-year series data leads to a broader view of land surface information. In tropical regions, e.g. Java Island, a paddy field might undergo a sequence of covers through the year, such as: (1) paddy-bareland-secondary crops-bareland, (2) paddy-bareland-inundated-paddy-bareland-secondary crops, and (3) paddy-bareland-secondary crops-bareland-inundated-paddy, where the sequence is repeated year after year following the seasons.

Characterization of vegetation dynamics has often been made by using vegetation index values, either the normalized difference vegetation index (NDVI) or enhanced vegetation index (EVI). The temporal dynamics of those index values are useful for distinguishing land surface conditions by differentiating among vegetation types and their distributions. We characterized the temporal vegetation dynamics of long-term land use by using multi temporal MODIS EVI 16-day composite data from 2001 to 2007.

The temporal pattern analysis was able to provide information of the planting, heading and harvesting dates of the lands; and also identified the change in dynamic agricultural system, such as cropping system changed from triple cropping system to double cropping system, also delaying of seedling stage while the rain season start changed, and others phenomena; however, the mixed pixel issue is quite problematic when using MODIS data.

The results explained that the seasons, it was the most of important factor which affected the change of dynamics agricultural system. The long-term dry season or extreme season by global climate changed caused many agricultural lands become un-planting as well the planting time was postponed. In some areas, even if the irrigation infrastructure exists locally in these areas, if irrigated water is limited, double or triple cropping may not possible in a given year. However, there are many aspects that impact the agricultural system, such as social capital, farmer welfare, irrigated water, and the price of crops.

Characterizing of temporal vegetation dynamics patterns would provide sufficient, significant and useful information of regarding the patterns of land use; consequently it should be possible to consider the actual subtle of inter-annual land use change as well as overall land use.

Keywords: temporal vegetation dynamics, land use, agricultural land, MODIS, Java Island, Indonesia